

# 22311

**22223**

**3 Hours / 70 Marks**

Seat No. 

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
  - (8) Use of steam tables, logarithmic, Mollier's chart is permitted.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Define the term temporary hardness and total hardness.
  - b) List out types of boiles accessories. (any four)
  - c) State different types of compressor.
  - d) State any two application of refrigerant in industry.
  - e) Define dry bulb temperature and wet bulb temperature.
  - f) List out types of steam.
  - g) State the uses of industrial water. (any two)

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Distinguish between zeolite and lime soda process. (any four)
  - b) Describe boiler act w.r.t.
    - i) Certificate of renewal
    - ii) Boiler accidents
    - iii) Transfer of boiler
    - iv) Boiler repairs
  - c) Explain the working of cyclone separator with neat labelled diagram.
  - d) Describe vapour absorption refrigeration cycle of Li-Br absorption system with neat labelled sketch.
- 3. Attempt any THREE of the following:** **12**
- a) Draw neat sketch of Ion-exchange process for demineralization of water.
  - b) Compare water tube boiler and fire tube boiler. (any four)
  - c) Suggest type of industrial air required in combustion process and also explain method of formation of suggested type.
  - d) Draw a neat sketch of induced draft cooling tower.
- 4. Attempt any THREE of the following:** **12**
- a) Mention different types of thermic fluids other than steam with their temperature ranges.
  - b) Distinguish between single stage and multistage air compressors. (any four)
  - c) Draw neat sketch of Babcock and Willcox boiler.
  - d) State the selection criteria for ideal refrigerant. (any four)
  - e) Differentiate between humidity and relative humidity. (any four)

**5. Attempt any TWO of the following:****12**

- a) A 5 tonne R12 plant maintains a cold store at  $-14^{\circ}\text{C}$ . The refrigerant flow rate is  $0.13\text{ kg/sec}$ . The vapors leaves the evaporators with  $6^{\circ}\text{C}$  superheat. Cooling water available at  $30^{\circ}\text{C}$ . A suction line heat exchanges subcools the refrigerant before throttling. Find
- The compressor discharge temperature
  - The COP (Coefficient of Performance)
  - The amount of subcooling in  $^{\circ}\text{C}$ .
- b) 50 ml of water sample consumed 14 ml of 0.01 M EDTA before boiling and 5 ml of the same EDTA after boiling. Calculate temporary hardness, total hardness and permanent hardness.
- c) Describe working of thermic fluid heater with neat sketch. Compare thermic fluid heater with steam boiler. (any two)

**6. Attempt any TWO of the following:****12**

- a) In a chemical process  $200\text{ m}^3$  of air per minute at  $15^{\circ}\text{C}$  DBT and 75% relative humidity is heated until its temperature is  $25^{\circ}\text{C}$  find
- Relative humidity of heated air
  - Wet bulb temperature of heated air
  - Heat added to air per minute
- b) State various defects of boiler feed water. Write chemical reaction for preventations of corrosion.
- c) Draw a neat sketch of pressure gauge of steam boiler and state the function of pressure gauge and water level indicator.
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